

## **REMARKS**

Applicant respectfully traverses the 35 U.S.C. § 103(a) rejection of claims 1 and 3 over Nemoto (U.S. 2002/016554), the § 103(a) rejection of claims 2, 7-9, and 11 over Nemoto in view of Inagaki (U.S. Patent 6,696,197), and the § 103(a) rejection of claims 10 and 12 over Nemoto, Inagaki, and U.S. Patent 6,437,542 to Liaw.

Claims 1 and 7 recite, among other things, a safety mechanism activated “before an inside short circuit occurs and discharges decomposition gas of the electrolytic solution . . . wherein an amount of the electrolytic solution . . . is equal to or larger than an amount at which an inflection point, that is related to a generation amount of the decomposition gas per unit time when the lithium ion secondary battery is overcharged, occurs.”

The claims recite the Applicant’s discovery that when the amount of the electrolytic solution is insufficient (*i.e.*, when the amount of electrolytic solution is smaller than the amount at which the inflection point appears), lithium is precipitated on the electrode and an inside short-circuit is likely to occur due to dendrite growth. Based on this discovery, and contrary to common understanding, the Applicant has claimed that an amount of the electrolytic solution provided into the lithium ion secondary battery is equal to or larger than an amount at which an inflection point, that is related to a generation amount of the decomposition gas per unit time when the lithium ion secondary battery is overcharged, appears.

Neither Nemoto nor Inagaki discloses or suggests the claimed relationship between an amount of electrolytic solution and an occurrence of an inside short circuit.

Moreover, neither reference discloses or suggests that an amount of electrolytic solution provided into the battery is equal to or larger than an amount at an inflection

point, that is related to a generation amount of the decomposition gas per unit time when the battery is overcharged.

Lacking disclosures or suggestions of at least these two claim features, Nemoto and Inagaki, viewed alone or in combination, fail to render the claims unpatentable under 35 U.S.C. § 103(a).

Liaw does not provide the teachings missing from Nemoto and Inagaki, so combining this reference with the other two references, also fails to render obvious any of the present claims.

The Examiner appears to mistakenly believe that space is necessary to store decomposition gas, *i.e.*, the electrolytic solution should be less than a threshold amount. At page 4 of the Final Office Action, the Examiner stated that “the optimum amount [of] electrolytic solution to be used is a result effective variable based on the rate of gas decomposition and the internal space of the battery.” This statement is incorrect, as established by the teachings of one of the very prior art references upon which the Examiner relies, *i.e.*, Nemoto.

Nemoto discloses at paragraph [0012]:

“... it is not preferable, from the viewpoints of durability, to keep it such a state that metal members other than the internal electrode body, sealing members of the battery case, and the like, are always in contact with the electrolyte solution since it causes often the leakage of the electrolyte solution, the corrosion of said members, or the like.”

Nemoto further discloses at paragraph [0013]:

“Accordingly, in the case of a large capacity battery, it is preferable to impregnate the internal electrode body thoroughly in an excessive amount of an electrolytic solution under a reduced atmosphere, and thereafter the excessive electrolyte solution is removed.”

Based on these disclosures of Nemoto, the apparent solution would be to reduce the electrolytic solution below a threshold amount.

The Applicant determined a surprising unforeseeable result, as set forth in the present claims, that an amount of the electrolytic solution provided into a lithium ion secondary battery is equal to or larger than an amount at which an inflection point, that is related to a generation amount of the decomposition gas per unit time when the lithium ion secondary battery is overcharged, appears. Optimization of a result-effective variable is not obvious when the result is an unexpected improvement. *See In re Antigone*, 195 USPQ 6, 8 (C.C.P.A. 1977).

The claims reflect a novel, unforeseeable result, and hence are not obvious.


In view of the above remarks, Applicant respectfully requests favorable reconsideration of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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